



Mount Gilead Stage 2 Residential Development

Proposed Koala Management Plan

Lendlease Communities (Figtree Hill) Pty Limited



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Template 2.8.1

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Abbreviations

Abbreviation	Description
Action	Means construction of a residential development including water and sewerage infrastructure, roads and open space recreation areas as defined in EPBC referral 2019/8587
Action area	The areas marked as 'development area' in Figure 1 of this report
Approval Holder	Lendlease Communities (Figtree Hill) Pty Ltd
APZ	Asset Protection Zone
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BCT	NSW Biodiversity Conservation Trust
Biocertification	Biodiversity Certification
BMDB	Bell Miner Die Back
BSAs	Biodiversity Stewardship Agreement sites (NSW BC Act)
CAR	Corrective Action Report
CCC	Campbelltown City Council
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CPW	Cumberland Plain Woodland
DAWE	former Commonwealth Department of Agriculture, Water and Environment (now DCCEEW)
Dbh	Diameter at breast height
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DEWHA	former Commonwealth Department of the Environment, Water, Heritage and Arts (now DCCEEW)
DotEE	former Commonwealth Department of the Environment and Energy (now DCCEEW)
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection & Biodiversity Conservation Act 1999</i>
KMP	Koala Management Plan
Lendlease	Lendlease Communities (Figtree Hill) Pty Limited
LGA	Local Government Area
MNES	Matters of National Environmental Significance
OEH	former NSW Office of the Environment and Heritage
PD Report	EPBC Act Preliminary Documentation Assessment Report
RFEF	River-Flat Eucalypt Forest
SEPP	State Environmental Planning Policy
SSTF	Shale Sandstone Transition Forest
SWMS	Safe Work Method Statement

Declaration of Accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this proposed Management Plan (*Mount Gilead Stage 2 Residential Development Construction Environmental Management Plan EPBC 2019/8587*) is complete, current and correct.
2. I am duly authorised to sign this declaration on behalf of the applicant.
3. I am aware that:
 - a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
 - b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.
 - c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed



Full name

Robert Keir Humphries, Eco Logical Australia Pty Ltd



Full name

Mark Iain Anderson, Lendlease Communities (Figtree Hill) Pty Ltd

Report Version: Eco Logical Australia 2023. *Koala Management Plan*. Prepared for Lendlease Communities (Figtree Hill) Pty Limited. Version 4, dated 20/07/2023.

1. Introduction

Eco Logical Australia (ELA) has been commissioned by Lendlease Communities (Figtree Hill) Pty Limited (Lendlease) to prepare a Koala Management Plan (KMP) for the proposed Mount Gilead Stage 2 Residential Development at Gilead, NSW, hereafter called 'the development'. Mount Gilead is located within the Campbelltown City Council (CCC) Local Government Area (LGA) approximately 5 km south of Campbelltown City centre on the following lots, Lots 1 and 2 DP1218887, Part Lot 5 DP1240836, Lot 2 DP603674, Lot 1 DP603675, Lot 1 DP622362 and Lot 2 DP249393 (Figure 1).

1.1 Objectives of the KMP

The KMP is being prepared to meet the requirements of the Preliminary Documentation (PD) requirements issued by the then Department of the Environment and Energy (DotEE) as part of the controlled action decision for EPBC 2019/8587 under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (see Appendix A of the PD Report), which state that the Preliminary Documentation Report (PD Report) must provide details of the proposed Koala Management Plan (as part of a Construction Environmental Management Plan (CEMP) for the proposed action.

The aims of this KMP are to: -

- identify potential threats to Koala within the 'action area' (i.e. the Mount Gilead Stage 2 Residential Development study area shown in Figure 1 during clearing, construction and operational phases of the project;
- provide mitigation measures to avoid impacts to the Koala during clearing, construction and operational phases of the project, and
- identify monitoring and reporting mechanisms and review / corrective actions to demonstrate compliance with the plan.

1.2 Planning and approval background

On 27 November 2019, the proposed Mt Gilead Stage 2 residential development (MGS2) was referred to the then Australian Government Department of the Environment and Energy (DotEE) (now Department of Climate Change, Energy, the Environment and Water (DCCEEW)) for consideration under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

On 24 February 2020, the then DAWE determined that the proposed action is a '*controlled action*', in relation to Matters of National Environmental Significance (MNES) including for impacts to the then vulnerable Koala and its habitat and that it will be assessed by preliminary documentation.

Accordingly, a Preliminary Documentation Environmental Assessment Report has been prepared (ELA 2023a) and was submitted to DCEEW for adequacy assessment will be placed on public exhibition along with this KMP and CEMP (ELA 2023b).

This KMP has been prepared to meet the PD requirements set by the then DotEE and is in addition to the commitment to legally secure the proposed offset areas via registration of Biodiversity Stewardship Agreements (BSAs) under the NSW Biodiversity Conservation Act (Section 9 of the PD report) and retire

all of the Koala credits generated by the 208.11 ha of existing and restored Koala habitat in the Gilead and Mt Gilead Homestead BSA sites.

Table 1 provides a summary of the commitments regarding Koalas from the PD report.

Table 1: PD Requirements for EPBC 2019/8587

PD Requirement	Where addressed in this KMP?
The PD Report must provide details of the proposed Koala Management Plan as part of a CEMP and a draft version of the KMP must be submitted with the PD.	This report
The KMP must include proposed mitigation measures to reduce impacts of the proposed action on the Koala consistent with state and local government policies for mitigation of impacts to Koalas. Relevant mitigation measures from State and Local Government policies include:-	Section 8.3.2.2 of PD Report and Section 5 of this KMP
avoid and minimise impacts to high quality koala habitat (BCAM and NSW Koala Recovery Plan (DECC 2008)	Section 3
identify and retain functional koala movement corridors (CS&E 2020 & 2021)	Section 3
Increase security, area and quality of Koala habitat (NSW Recovery Plan, Campbelltown CKPoM Biolink 2018)	Section 3
introduction of fauna underpasses on Appin Road to mitigate road deaths (Campbelltown CKPoM Biolink 2018)	Section 3
use of Koala exclusion fencing to prevent access by dogs and restrain Koala from moving into urban areas where they are susceptible to cars and domestic dogs (CS&E 2020, Campbelltown CKPOM)	Section 5
Predator management (Recovery Plan, CS&E, Campbelltown CKPoM)	Section 3
Koala monitoring and adaptive management program (Recovery Plan and CS&E 2020)	Section 8

1.3 Application

The 644.27 ha Mount Gilead Stage 2 'Study Area' (**Figure 1**) consists of:

- Proposed Urban areas (and associated infrastructure) -259.0320
- Proposed conservation Areas (three proposed Biodiversity Stewardship sites) – 235.96
- Retained Land (Gilead Homestead and Open Space) – 149.28

This KMP applies to the clearing and construction phases of the proposed action and post construction operational phases of the development within the areas marked as 'Development Area' and the conservation objectives and outcomes within the proposed conservation areas. in **Figure 1**.

1.4 Outline of the KMP

This KMP sets out:

- A description of the action area
- a summary of research on the Koala in relation to the action area
- potential impacts of the development on the Koala
- Koala management actions during the following phases of the development:
 - Design
 - Construction, and
 - Operation
- training, education and awareness
- monitoring.

2. Development area description

The action area is located at Appin Road Gilead, in the southwest of the Sydney metropolitan area, approximately 7 km south of the Campbelltown city centre (Figure 1).

The site history and its condition has informed the planning and location of urban development areas to ensure its many natural assets and heritage values are preserved. Continuous and progressive agricultural activities have occurred on the development site since the 1800's, which has led to the progressive clearing of approximately 80% of the native vegetation across the majority of the site other than along creek lines which provide a contiguous corridor of native vegetation linking Noorumba Reserve and the Beulah Biobank sites adjacent to Appin Road to the Nepean River.

The proposed urban development area covers a total area of approximately 259.02 hectares predominantly located in areas of cleared with improved pastures or scattered trees over improved pastures (Figure 2). Pockets of residual vegetation are located along drainage lines and steeper slopes. The site comprises remnant and degraded native vegetation and exotic pastures.

The development area consists of urban development including the development of:

- Residential and non-residential land uses
- Recreation and active Open Space areas, with some landscaping consistent with local native vegetation;
- Services, including water, sewer and electricity infrastructure;
- A street network of roads, access ways and parking;
- Bushfire Asset Protection Zones (APZ);
- Detention basins to capture and treat run-off water captured by road curbs and gutters;
- Protection and maintenance of existing riparian corridors and rural areas.

The construction phase is expected to be undertaken in stages over an expected timeframe of 10 years commencing in 2025.

Figure 3 shows the extent of koala habitat within the action area and which habitat areas will be impacted and which comprise 'retained' habitat areas (rural land and Biodiversity Stewardship sites – offset areas).

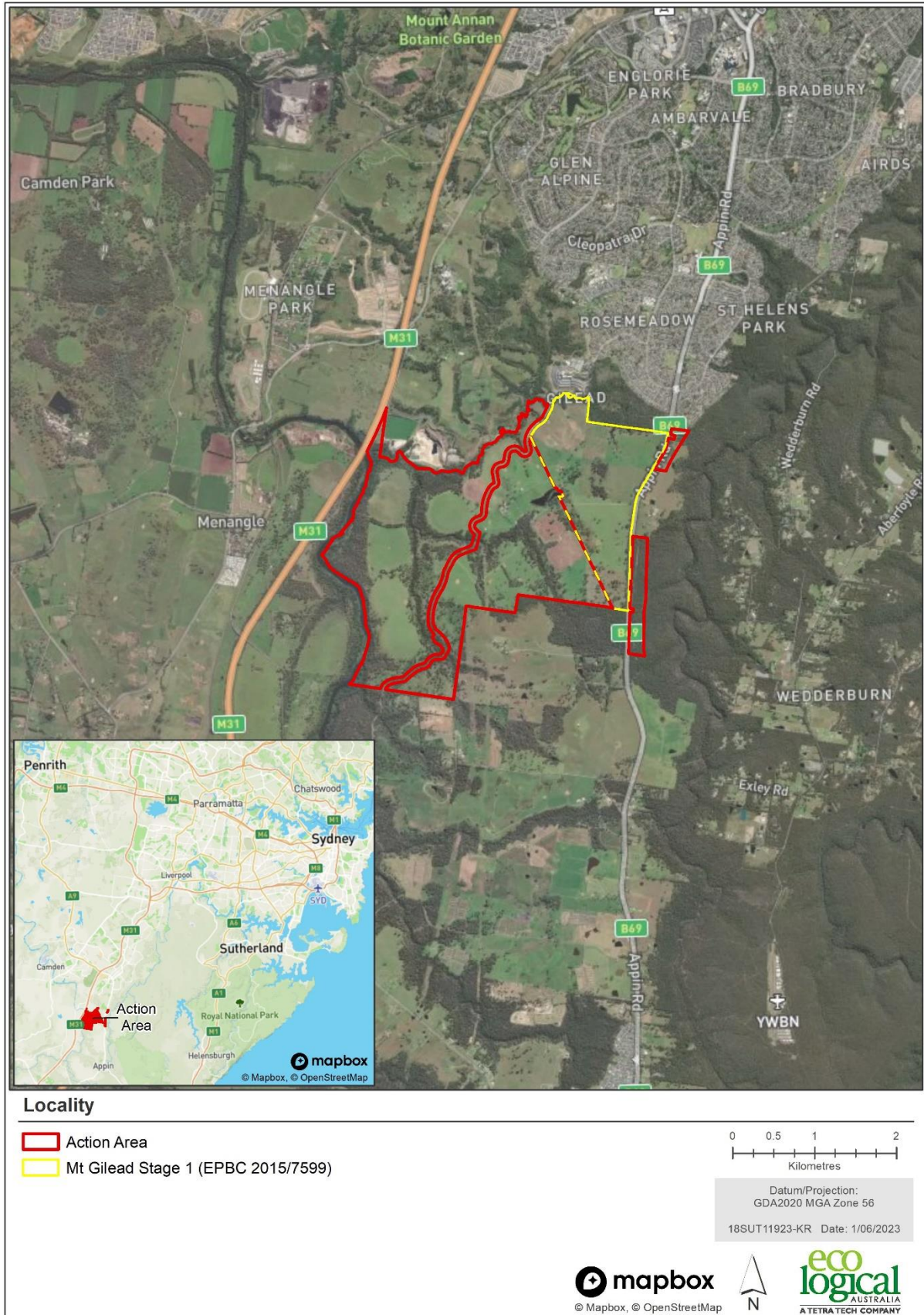


Figure 1: Location of the Action area

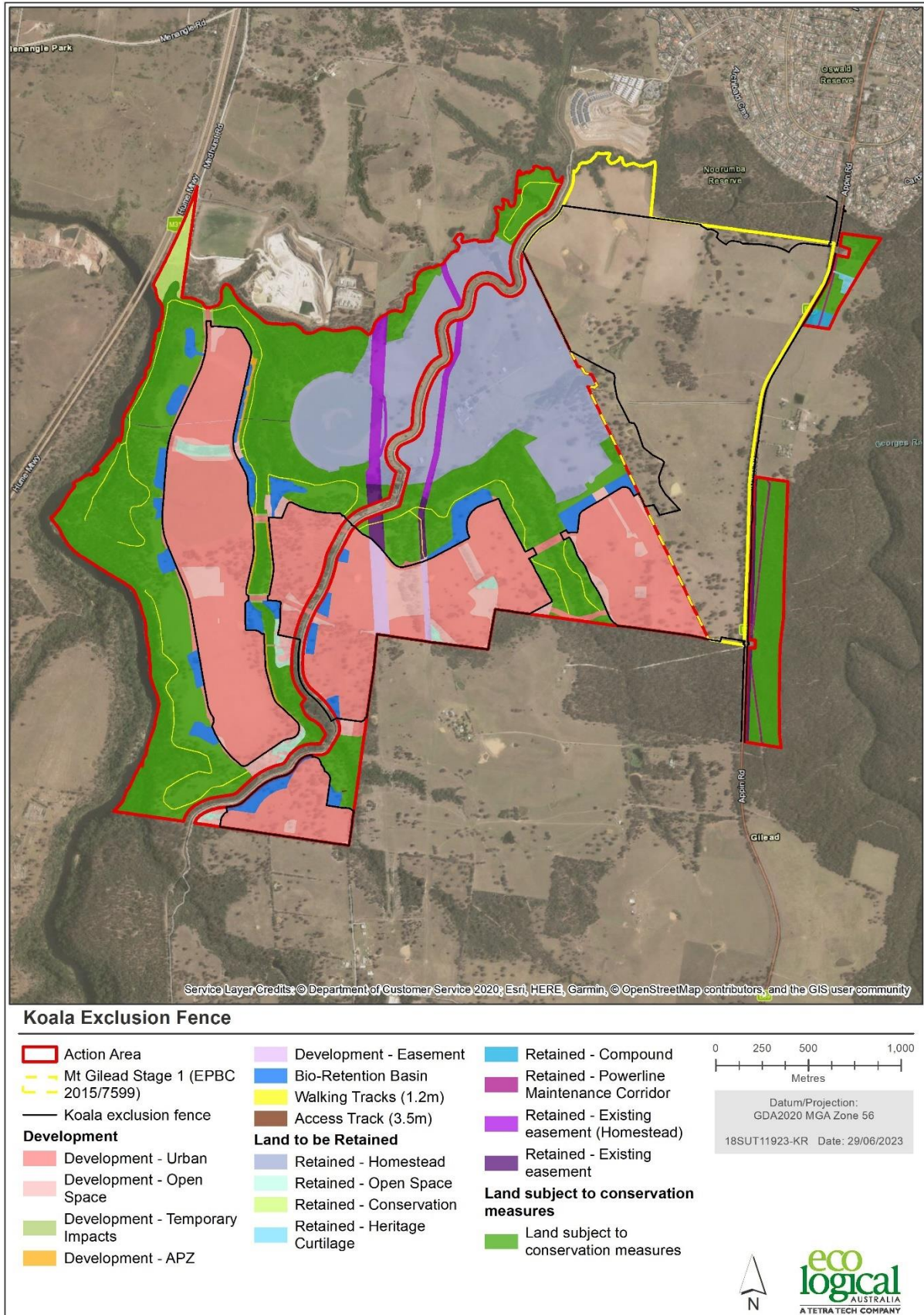


Figure 2: Proposed Development area (Land to be certified) for 2019/8587

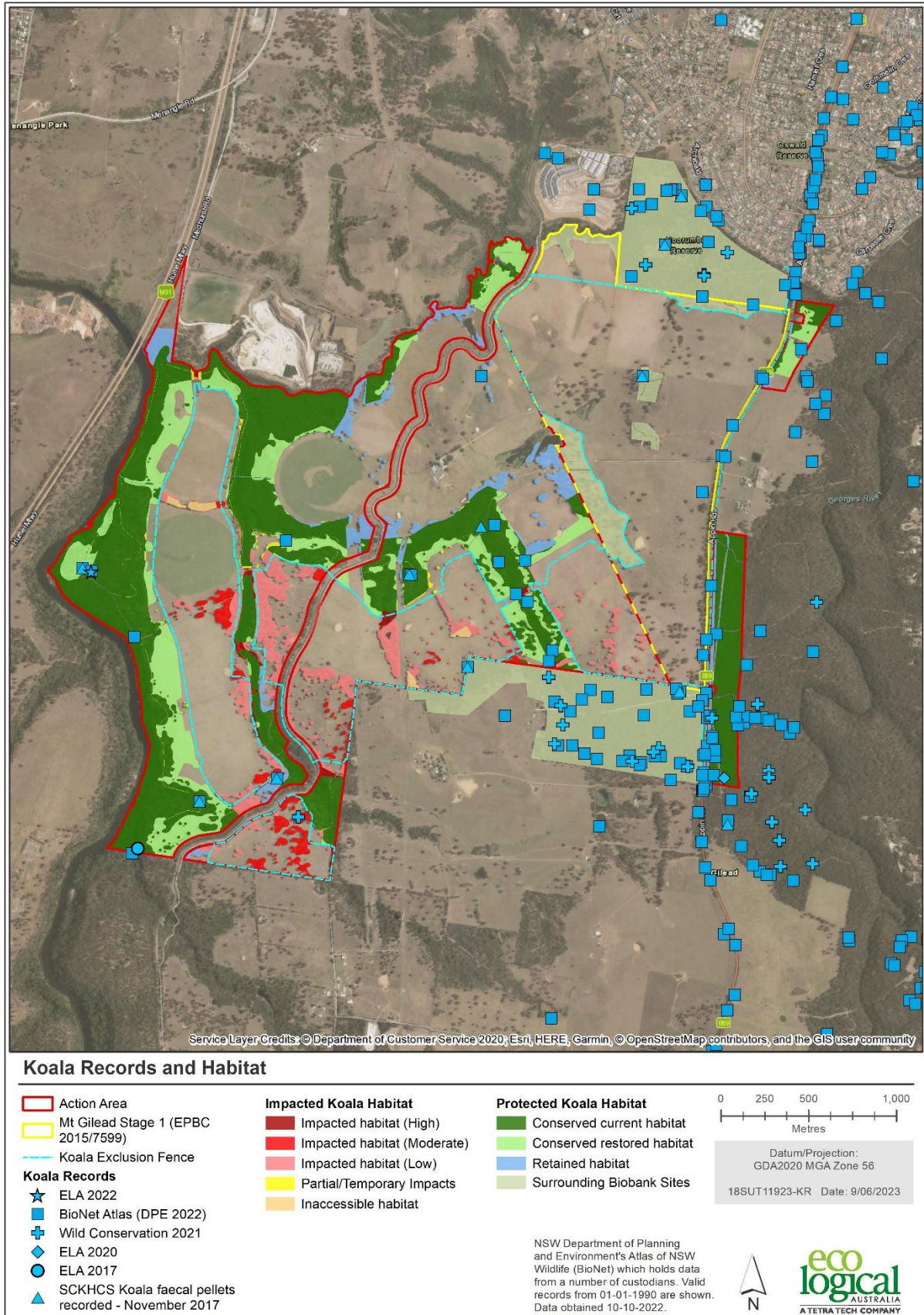


Figure 3: Impacted and protected Koala habitat as proposed in EPBC 2019/8587

3. Koalas in the Study Area

3.1 Distribution and habitat

Numerous surveys and studies have been undertaken within and around the Study Area and Action Area which contain information relating to the Koala, including the:

- Mt Gilead MDP Land Rezoning Ecological Assessment (ELA 2014);
- Mt Gilead MDP land Biodiversity Certification Assessment Report and Biocertification Strategy (ELA 2018a);
- Mt Gilead Stage 2 Biodiversity Certification Assessment Report and Biocertification Strategy 2016-2023 (ELA 2023a);
- South Campbelltown Koala Habitat Connectivity Study (Biolink 2018a);
- The revised Comprehensive Koala Plan of Management (CKPoM) for the Campbelltown LGA (Biolink 2018b).
- Office of the NSW Chief Scientist & Engineer advice on koala protection (2019, 2021a & 2021b); and
- Annual Mt Gilead Koala population studies 2021 and 2022 (Wild Conservation (2021 & 2022)

Biolink (2018b) estimated the area of occupancy of Koala in the Campbelltown LGA in 2012 (which includes habitat in the study area) at 6,857 ha with a population estimate of 177 +/- 12 Koalas. In 2021 Biolink provided an update to this estimate based on an increase in the geographic extent of Koalas across the Campbelltown LGA with a revised population estimate 236 +/- 60 Koalas (Biolink 2021) and noted this as an almost fifty percent increase in population size since 2012. Other sources estimate the population in the LGA at between 300-400 Koalas (DPIE 2020) and the 'local population' at 400-500 in the Campbelltown, Appin and Wilton areas (which includes the Wollondilly LGA) (DPIE 2019), and submissions to the NSW Upper House Koala enquiry (DPIE 2020).

Surveys undertaken of the study area for the Mt Gilead Stage 2 Biodiversity Certification Assessment (ELA 2020) recorded evidence of Koala utilising the study area along the Nepean River corridor in the west, and to the east of Appin Road (the proposed Browns Bush Stewardship Site) (Figure 3). Further surveys were undertaken in 2021 and 2022 by Wild Conservation using drones with thermal imaging cameras in combination with simultaneous on-ground validation that also confirmed Koala individuals utilising the study area, as well as high densities of Koalas in the Beulah Biobank site and on the eastern side of Appin Road.

These studies provide a consistent record of Koala from the broader locality over the past 20 years and use of the study area by Koalas.

In 2021 the Office of the NSW Chief Scientist & Engineer provided 4 overarching recommendations to ensure the adequacy of koala protection measures for the Campbelltown Koala population. These measures were:

- increasing and improving existing habitat by, for example, establishing the Georges River Koala Reserve;

- improving connectivity by constructing koala movement crossings and protecting koalas from urban threats with exclusion fencing;
- active monitoring and using adaptive management for koalas; and
- adopting good practices for disease prevention including vaccinations.

3.2 Habitat

The most important habitat factor influencing Koala occurrence is the suite of food tree species available. In any one area, the Koala relies primarily on regionally specific primary and/or secondary food tree species. If primary food tree species are not present or occur in low density, Koalas will rely on secondary food tree species, but the carrying capacity of the habitat (i.e. number of animals per hectare) is inevitably lower (DECC 2008).

The Campbelltown Comprehensive Koala Plan of Management (Biolink 2018b) lists eight primary; secondary and supplementary preferred food tree species in the Campbelltown LGA (**Table 2**), four of which have been recorded in the Study Area.

The Study Area contains remnant Cumberland Plain Woodland (CPW), Shale Sandstone Transition Forest (SSTF), which are listed as Critically Endangered Ecological Communities (CEECs) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and EPBC Act 1999, and River-Flat Eucalypt Forest (RFEF) which is listed as an Endangered Ecological Community (EEC) under the BC and EPBC Acts. These vegetation communities provide habitat for Koala, including Koala feed and use trees. The majority of the intact areas of these communities (151.58 ha and 56.54 ha of habitat restoration) are to be protected within the proposed Gilead and Mt Gilead-Homestead stewardship sites (offset areas) as shown in Figure 3 with a third BSA also ben registered over 26.89 ha of Koala habitat at Browns Bush, adjacent to, and part of the proposed Georges River National Park.

Table 2: Koala Food Trees in the CCC LGA (Source Biolink 2018b)

Species Name		Present in Study Area
Primary Food Tree		
<i>Eucalyptus tereticornis</i>	Forest Red Gum	Yes (RFEF & CPW)
<i>Eucalyptus viminalis</i>	Ribbon Gum	No
Secondary Food Tree		
<i>Eucalyptus longifolia</i>	Woollybutt	No
<i>Eucalyptus moluccana</i>	Grey Box	Yes (CPW)
<i>Eucalyptus punctata</i>	Grey Gum	Yes (SSTF)
Supplementary Food Tree		
<i>Eucalyptus agglomerata</i>	Blue-leaved Stringybark	No
<i>Eucalyptus consideniiana</i>	Yertchuk	No
<i>Eucalyptus globoidea</i>	White Stringybark	Yes (SSTF)

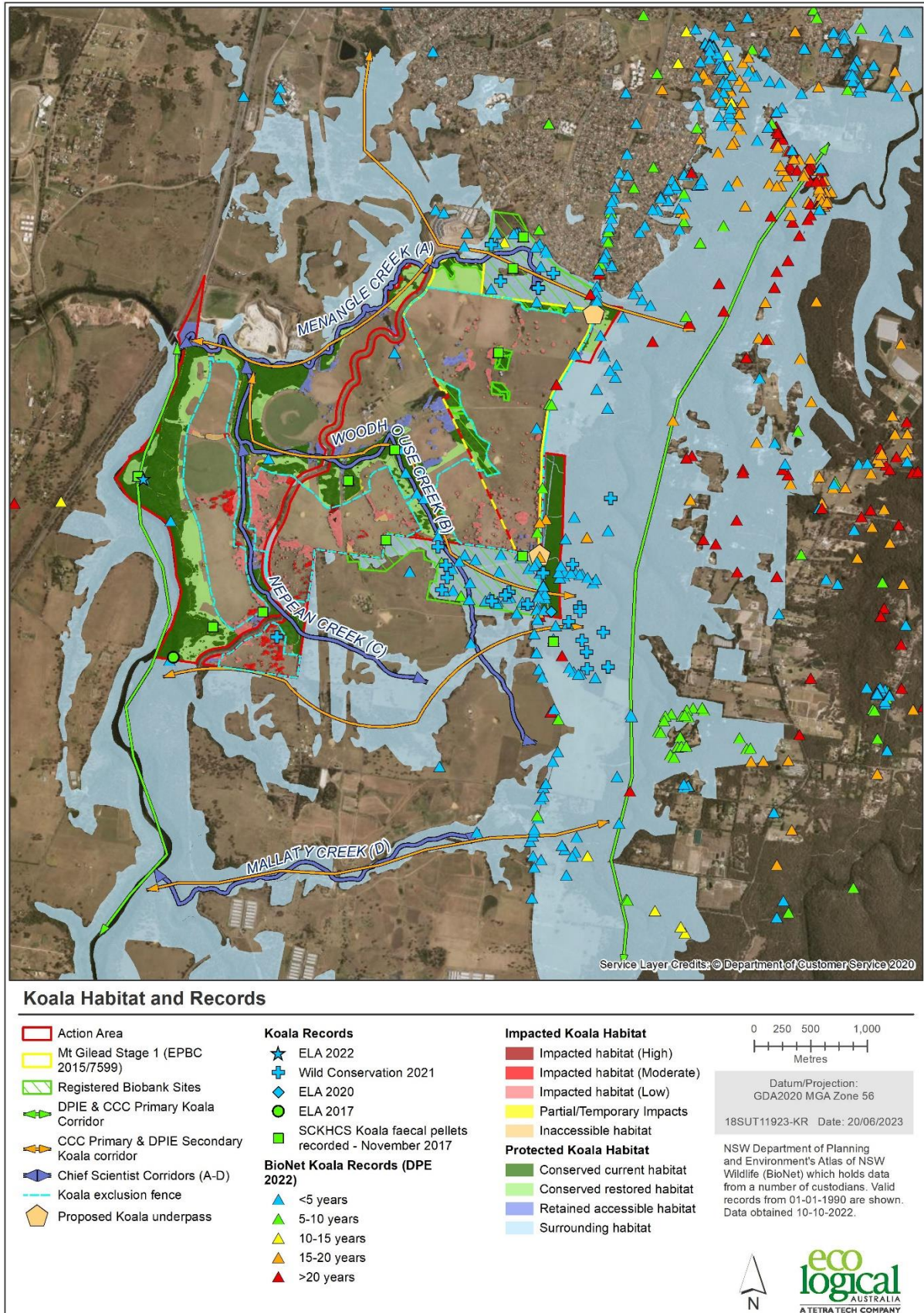


Figure 4: Koala habitat, records and likely movement corridors in the action area and wider locality

4. Listing Status and Conservation Priorities

The Koala was listed as a vulnerable species in NSW under the now repealed Threatened Species Conservation Act in 1996 and a Recovery Plan was approved in 2008 (DECC 2008). The NSW, ACT and Queensland combined populations of the Koala were also listed as a vulnerable species under the EPBC Act in 2011 and a National Koala Conservation and Management Strategy was released in 2009 (DEWHA 2009).

Following the impacts of prolonged drought, followed by the black summer bushfires in 2019/2020, and the cumulative impacts of disease, urbanisation and habitat loss over the past twenty years, the QLD, NSW and ACT Koala combined population up-graded to endangered under the EPBC Act in February 2022 and endangered in NSW under the BC Act in May 2022. A National Koala Recovery Plan was also adopted in March 2022 (DAWE 2022b).

The EPBC Act 2022 Conservation Advice for Koala (DAWE 2022a) outlines 8 threats to koalas in two categories:-

- Threats as Climate Change driven processes
- Drivers of disease and health.

The purpose of the National Koala Recovery Plan is to provide for the research and management actions necessary to stop the decline of, and support the recovery of, the listed Koala so that the chances of its long-term survival in nature are maximised. It is the road map to recovery.

The Recovery Plan outlines three objectives:-

Objective 1

- The area of occupancy and estimated size of populations that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased.
- The area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased.

Objective 2

- Metapopulation processes are maintained or improved.

Objective 3

- Partners, communities and individuals have a greater role and capability in listed Koala monitoring, conservation and management.

5. Threats to Koala

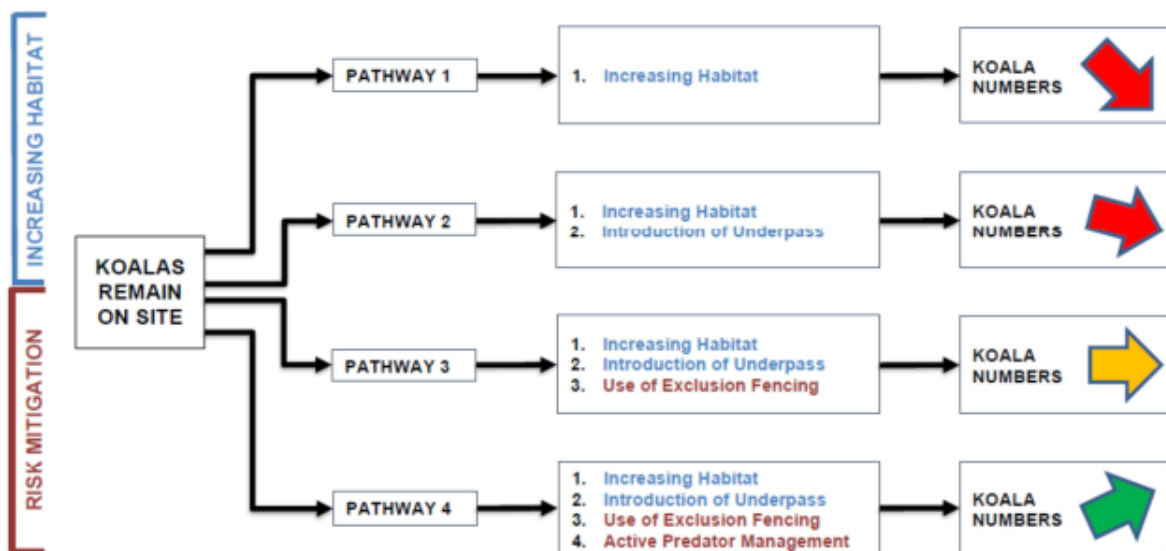
DAWE 2022a identifies a series of threats to the Koala in Queensland, NSW and the Act whilst the Office of NSW Chief Scientist & Engineer (OCSE) identifies a number of threats to Koala’s in the Campbelltown area (OCSE 2020 and 2021a and b). Each of these threats are describe below and mitigation measures are detailed in Section 5.

In 2019, the OCSE was asked to provide independent expert advice on protecting the Campbelltown koala population.

In August 2020, the OCSE published a report titled Advice on the protection of the Campbelltown Koala population – Koala Independent Expert Panel.

The report provides 4 overarching recommendations to ensure the adequacy of koala protection measures. These measures include:

- increasing and improving existing habitat by, for example, establishing the Georges River Koala Reserve
- improving connectivity by constructing koala movement crossings and protecting koalas from urban threats with exclusion fencing
- active monitoring and using adaptive management for koalas
- adopting good practices for disease prevention including vaccinations.



5.1 Loss, modification and fragmentation of habitat

Land clearing has been a significant cause of direct Koala mortality and for limiting the movement of Koala within a sub-population. This effect is exacerbated in urban environments where the surrounding matrix is relative hostile with higher densities of roads and dogs exacerbating this effect (DotE 2014).

Small, fragmented or highly disturbed habitats are less likely to be able to support a Koala population in the long term due to edge effects, limited resource availability and increased predation. Although Koala do utilise scattered trees in largely cleared environments, travelling across open ground leaves them more vulnerable to threats such as predation. Vegetated links are important to support continued Koala movement; where dispersal and recruitment are impeded by barriers such as large areas of open ground and roads, populations would be expected to decline (DECC 2008).

5.2 Traffic injury/ death

Road-kill is a risk to Koalas at any location where a resident koala population and/or regularly used koala movement path is dissected by roads and traffic. There are several records of Koala road kill to the east of the study area along Appin Road, where Koalas are likely using habitat resources on both the eastern and western sides of Appin Road. Risks of koala road kill increases where (DECC 2008):

- Road speed limits exceed 60 km/hour;
- Traffic volume is high;
- There is low visibility of road edges (such as due to vegetation or lack of lighting); and
- The koala breeding season is on (mid-August through to mid-summer).

In addition to direct impacts (i.e. koala death on roads), the construction of roads through koala habitat can also disrupt breeding and social interactions and isolates populations, reducing dispersal and immigration opportunities.

5.3 Attacks by feral and domestic dogs

Dog attacks are a threat to Koalas that are closely associated with urban expansion, with exposure to the threat increasing as land adjacent to Koala habitat is developed and occupied (DotE 2014). Additionally, attacks by dogs are likely to be more common during the koala breeding season as this is when koalas are more active and more likely to be moving through cleared areas (DECC 2008).

5.4 Disease

Koala populations in NSW carry the pathogen Chlamydia. Campbelltown is reported as having one of the few disease-free koala populations in the Sydney Region (Biolink 2018b). However, Koalas are more likely to develop chlamydiosis infection when exposed to environmental stresses such as loss of habitat, harassment by predators, nutritional stress or overcrowding (DECC 2008).

5.5 Other threats to Koala habitat such as Bell Miner associated dieback, climate change and stressors

Bell Miner associated dieback (BMAD) is listed as a key threatening process under the NSW Biodiversity Conservation Act 2016 and is known to directly impact vegetation communities and habitat for threatened fauna, including Koala (OEH 2018).

BMAD is a process whereby dense Bell Miner colonies (a native honeyeater) facilitate sustained psyllid infestations that lead to dieback. It is thought that habitat degradation that leads to increases in understory density, often via woody weed invasion, are heavily implicated in the process (Silver and Carnegie 2017).

BMAD has been observed in the Noorumba Reserve adjacent to the action area and along parts of Woodhouse and Menangle Creeks (Biolink 2018a).

The continuing threat of climate change and its associated impacts (such as increase in frequency and intensity of bushfires, drought, availability of and access to water) can significantly affect koala populations, area of habitat and can limit their current range (CS&E 2020). The effects of climate change can further complicate other threats such as fragmentation and loss of habitat from urbanisation where habitat is limited. Maintenance of connectivity and minimising habitat fragmentation are important to reduce the risk of population decline.

Stressors such as increases in noise and light can increase stress levels in koalas and pose an indirect threat to the species, leading to changed patterns of behaviour, avoidance of exposed habitat and increased propensity to disease (CS&E 2020).

6. Koala management actions

This Koala PoM was prepared to provide detailed operational guidance for the implementation of the environmental management actions outlined in the EPBC Preliminary Documentation Assessment Report for the action area (ELA 2023a) and includes mitigation measures and recommendations included in the CCC CKPoM (Biolink 2018b), Biolink 2018c, and the NSW and National Koala Recovery Plans and Management Strategies (DECC 2008, NSW Government 2018, DAWE 2022b). Additionally, it details on-going actions detailed in the management plans for the three BSAs in the study area.

Koala management actions are detailed below, and include actions for the design, construction and operation phases where relevant.

6.1 Measures to minimise impact on koala habitat and to resident Koalas

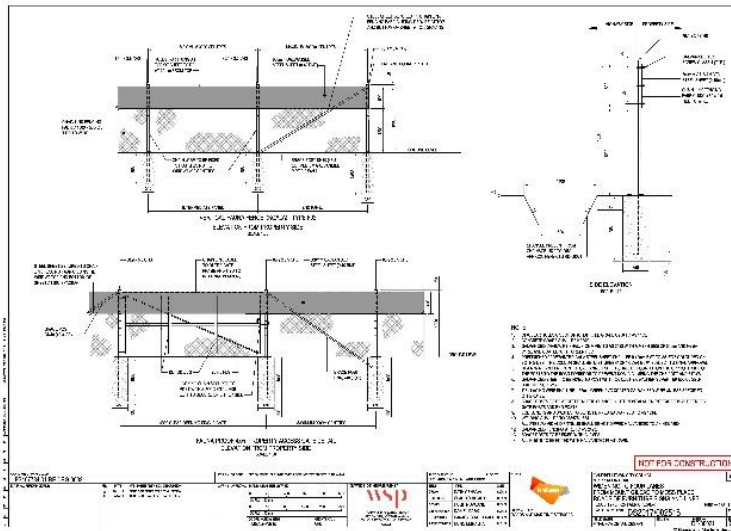
6.1.1 Design

Measures to avoid and/or reduce impacts to biodiversity values have been included during the design stages of the project, including:

- Identification and avoidance of high or higher conservation value areas during the rezoning and Masterplan process (2015-2021)(Figure 3)
- Design of subdivision layout, including perimeter roads, Asset Protection Zones and buffer zones to reduce impacts to and protect offset areas (Figure 2)
- Inclusion of Koala exclusion fencing around all offset areas to separate Koalas from urban areas (cars, dogs)
- Identification of functional ecological corridors that meet the recommendations of the NSW CS&E (2020) (Figure 4)
- Identification of areas to reconstruct and restore Koala habitat, with preferential feed tree plantings, consistent with the composition of Cumberland Plain Woodland and Shale Sandstone Transition Forest to increase the area of Koala habitat (Figures 3 and 4)
- Permanent protection and management of these areas for conservation through registration as Biodiversity Stewardship Sites and commitment to install koala exclusion fencing to keep koalas in corridors, dogs out, and prevent roadkill (Figure 5)
- Provision of connectivity infrastructure (fauna underpasses) to facilitate safe movement through the action area, retaining the connectivity and enhancing the link between the Nepean River and Georges River corridors (Figure 6).



New Design Koala Exclusion Fence – RMS Picton Road



Gilead fence 1,500mm high with 600mm panel

Figure 5: Proposed Koala exclusion fencing for all offset areas

6.1.2 Pre-Construction Phase

All Project personnel and contractors will undergo environmental induction training before commencing work on site. Information to be addressed during this training will include: -

- Koala identification and location of habitat areas within the action area
- Procedures to be followed in the event that Koalas are found injured in the proximity of works areas.

6.1.3 Construction Phase

The following mitigation measures will be implemented during construction of the development:

- Appointment of a Project Ecologist for the duration of clearing works to ensure conditions relating to biodiversity management of the site are fully implemented and complied with
- Commitment to prepare and implement a Construction Environmental Management Plan
- Temporary and permanent protective fencing to be erected around all areas identified for conservation within the development area, including within Open Space areas and Biodiversity Stewardship Sites prior to clearing activities commencing to minimise any inadvertent damage.
- A Koala Tree Felling Protocol (**Appendix A**) will be implemented to avoid any direct impacts to Koala that may be utilising trees to be cleared.
- Any trees identified as “to be retained” following project ecologist pre-clearing review, shall be included on an environmental control map and clearly marked with an easily visible and removable means of identification
- Use of drone techniques to assist in pre-clearance surveys and post construction monitoring of the local Koala population.

6.1.4 Operational Phase

6.1.4.1 Landscaping in Open space/recreation areas

Landscaping and revegetation within the Open Space/Recreation areas will include tree species which are part of the Endangered Ecological Communities recorded within the study area (Cumberland Plain Woodland (CPW); Shale Sandstone Transition Forest (SSTF) and River-flat Eucalypt Forest) and which have been identified as primary or secondary Koala Tree Feed Species in the NSW Koala Recovery Plan (DECC 2008), CCC CKPoM (Biolink 2018b) and the SEPP (Koala Habitat Protection) 2021. Trees that will be used in landscape areas and that will supplement protected CPW and SSTF vegetation in offset areas are listed in Table 3.

Table 3: Koala Food Trees to be used in landscaping consistent with Cumberland Plain Woodland and Shale Sandstone Transition Forest characteristic species present in the study area

Species Name	
Primary Food Tree	
<i>Eucalyptus tereticornis</i>	Forest Red Gum
Secondary Food Tree	
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus punctata</i>	Grey Gum
Supplementary Food Tree	
<i>Eucalyptus globoidea</i>	White Stringybark

6.1.4.2 Management of Koala habitat in Biodiversity Stewardship sites

Koala habitat within the Biodiversity Stewardship Sites will be managed in accordance with the Biodiversity Stewardship Agreement Management Plans.

This includes the erection of Koala exclusion fencing around all offset areas and movement corridors throughout the action area (as shown in Figure 4) to prevent access to retained habitat by dogs, revegetation and supplementary planting of preferred Koala browse species in cleared areas, feral animal and weed control and access restrictions.

Each Stewardship site includes riparian areas and have retained farm dams to ensure a constant supply of water in regards to likely climate change implications.

Each Stewardship areas also has a bushfire management plan which includes an ecological burning regime in a small scale mosaic so that at any one point in time, only a relatively small proportion of the entire offset area is recently burnt.

Each stewardship site is subject to on-going monitoring, annual reporting and audit and compliance requirements of the NSW Biodiversity Conservation Trust (BCT).

Annual drone based koala monitoring across the action area, on-site offset areas and surrounding conservation areas will be implemented to determine and track the local koala population's use of the conservation areas and number of animals until the 'completion of the action'. Drone survey protocols will follow the method described in (Beranek et al. 2020) and previous surveys undertaken by Wildlife Conservation in 2021 and 2022 (Wild Conservation 2021, 2022).

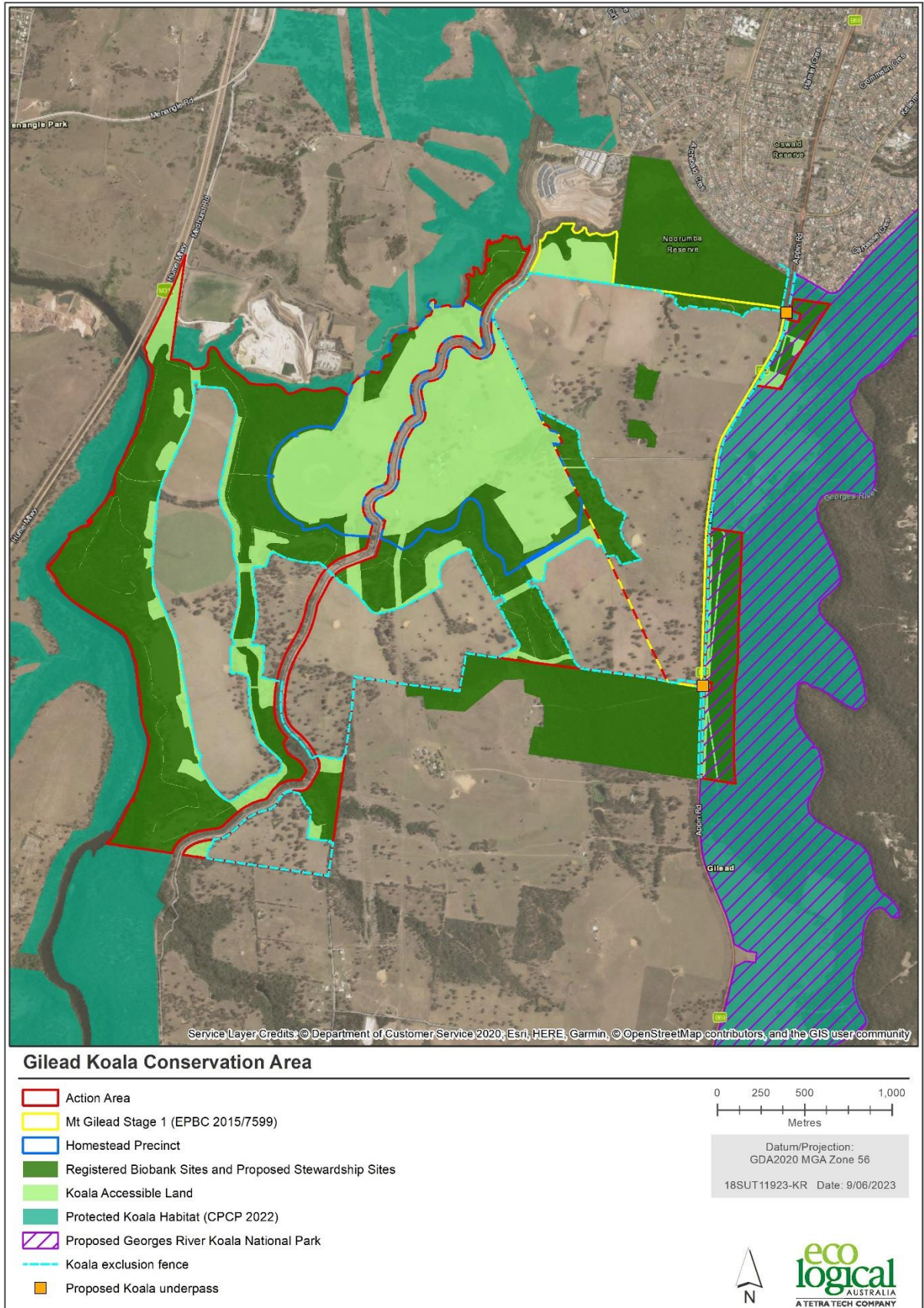


Figure 6: Open Space landscaping areas using local Koala browse species

6.2 Predation by dogs

6.2.1 Design

Increased koala injuries and fatalities from attacks by dogs are likely to occur with the increased proximity to urban areas. Design measures to mitigate predation by dogs included in the development include:

- 1,500mm high (with smooth panel) Koala exclusion fencing around all offset areas with double gates at walking patch access points to prevent entry by dogs (Figure 5)
- Dog proof fencing will be a design requirement for each residential lot in accordance with the Gilead Home Design Guidelines (Lendlease 2019) and Campbelltown Council requirements
- Enforced prohibition of dogs within Biodiversity Stewardship Site areas
- Designated dog-proof fenced areas within open space / recreation areas where dogs will be permitted to be off leash
- Public Open space areas and Biodiversity Stewardship Sites will have fencing and site specific signage designed to outline prohibited activities and penalties which will apply. Example of typical Council Reserve fencing and signage is shown in **Appendix B**.

6.2.2 Operational Phase

- In public open spaces, all dogs will be required to be kept under control by their owners, in accordance with Local Government Act 1993, failure to comply may lead to a penalty exceeding \$110
- Dogs will be prohibited from entry into the Biodiversity Stewardship Sites. These areas will be actively managed and subject to enforcement powers under the Local Government Act 1993, failure to comply may lead to a penalty exceeding \$110
- All public areas will be effectively signposted with signs which outline permitted and prohibited activities and outline penalties which will apply for non-compliance. Example of typical Council signage is shown in **Appendix B**
- Multi-lingual education programs, community information packages, community information seminars and community education events will be held for residents regarding the requirements for dogs within the development. The programs will highlight increased risk of dog attacks during koala breeding season (mid-August through to mid-summer). These programs will be held onsite regularly over a 5 year period by the Developer.

6.3 Traffic injuries or death within the action area

6.3.1 Design

Increased koala fatalities from vehicle strike are likely to occur within the action area due to an increase in traffic volume in the area from population increase, unless appropriate mitigation measures are put in place. Traffic calming measures proposed in the development include:

- Fencing of all conservation areas
- Local roads will have speed limit restrictions of 50 km/h adjacent to open space areas
- Perimeter roads and roads adjacent to Koala habitat areas will be signposted in accordance with Austroads, RMS technical guidelines, Campbelltown City Council Guidelines and Australian Standards. (Indicative signage is shown in Figure 7)
- Traffic calming devices will be installed along perimeter roads adjacent to offset areas and Koala habitat
- Vegetation adjacent to roads will be managed to increase visibility of fauna (Figure 8).

Koala mitigation measures associated with the NSW Roads and Maritime Services proposal to upgrade Appin Rd, to the east of the action area and adjacent to the proposed Browns Bush Stewardship Site (RMS 20018a and 2018b) are not addressed in this management plan as they are subject to a separate approval process. The environmental assessment for this project proposes Koala exclusion fencing around all retained Koala habitat, to maintain connectivity between the Georges and Nepean Rivers and protect local koala's from road mortality and dog attacks.

6.3.2 Construction

Traffic management measures to be implemented during construction, include:

- Construction traffic to utilise clearly defined access and egress points to and from the development site that avoid retained Koala habitat areas
- Construction traffic within the development site to keep to designated routes where possible
- Parking and equipment and material laydown areas to be positioned away from conservation areas
- Construction traffic is to adhere to construction zone speed limits of 20 km/h across the site
- Exclusion fencing will be installed prior to site works commencing to delineate the limit of areas impacted by the works and accessible by construction traffic.

6.3.3 Operational Phase

Management strategies presented below aim to increase the application of a precautionary approach to reducing the potential for Koala road strike and to increase driver and community awareness:

- 'Koala Warning Signs' dispersed throughout the Mount Gilead road network (example signage shown in Figure 7)
- Roadside vegetation adjacent to conservation areas (1-2m) will be managed to minimise the height of ground cover and therefore increase the visibility of any roadside fauna. Turfed areas will be mown, low ground covers will be trimmed mechanically (indicative road verges shown in Figure 9).



Figure 7: Indicative Koala Warning Signs to be erected on major urban streets adjacent to Koala habitat areas (Images courtesy Campbelltown City Council Koala Management Plan 2018)



Figure 8: Indicative management of roadside verges to increase visibility of fauna on roadsides

Note fencing will be Koala exclusion fencing)

6.4 Diseases and pathogens

6.4.1 Design, Construction and Operation:

As Koalas are more likely to develop chlamydiosis infection when exposed to environmental stresses such as loss of habitat and harassment by predators, mitigation measures described in Section 5.1 and Section 5.2 will also minimise the risk of chlamydiosis infection by minimising stress to animals through the design, construction and operational phases of the development.

6.4.2 Construction and Operation

Pathogens such as myrtle rust and *Phytophthora* root rot can be spread if carried on infected plant material, contaminated equipment, vehicles and clothing. The following hygiene measures will be put in place to limit the risk of introduction and spread of pathogens during construction of the development, and as part of the management and operation of the Biodiversity Stewardship Sites:

- all vehicles, machinery, maintenance equipment, tyres and work boots should be free of mud, soil and vegetation prior to entering and leaving the construction site (as outlined in the Mt Gilead CEMP (ELA 2021))
- Follow the *Arrive Clean, Leave Clean: Guidelines* (Commonwealth of Australia 2015).

6.5 Bell Miner die back

6.5.1 Operational Phase

Biodiversity Stewardship Sites will be managed to maintain an open grassy woodland environment consistent with the typical form of Cumberland Plain Woodland and Shale Sandstone Transition Forest. This will include the active management of dense wood weed understory (Blackberry and Lantana) to reduce nesting opportunities for Bell Miner.

6.6 Education and awareness

Education has a key role to play towards ensuring the long-term survival of the Koala in the action area, and the following educational measures will be implemented for the development:

6.6.1 Design Phase

- Permanent signage will be installed adjacent to pathways and entry roads to the site, to raise awareness of the potential presence of koalas within and adjacent to the site.

6.6.2 Construction Phase

- All personnel, including sub-contractors, are required to attend a compulsory site induction. This will include a section on key environmental sensitivities, including the identification and potential presence of Koalas.
- Targeted environmental awareness training will be provided to individuals or groups of workers with a specific authority or responsibility for environmental management or those undertaking an activity with a high risk of environmental impacts, including vegetation clearing controls.
- Toolbox talks will be used to raise awareness and educate personnel on construction related environmental issues, and to ensure environmental awareness continues during construction. Toolbox talks will be tailored to specific environmental issues including:
 - biodiversity values and conservation areas
 - Koala management
 - emergency and spill response
- The daily pre-start meeting will be conducted for the site workforce before the commencement of work each day (or shift) or where changes occur during a shift. The environmental component of pre-starts will include any environmental issues that could potentially be impacted by, or impact on, the day's activities, including vegetation clearing.

6.6.3 Operational Phase

Education programs are the principal means by which the community can gain a full appreciation of relevant issues and the actions which they can undertake to aid koala conservation within the action area.

A local resident education and awareness campaign will be carried out which will include information on:

- Potential Koala habitat and Koala presence within the Gilead community
- the need to drive with caution throughout the Mt Gilead community (refer to road signage and traffic calming devices in Section 5.3)
- process of managing injured Koalas, including contact details for WIRES
- best practices for dog owners, including:
 - raising awareness of the impact of dogs on Koalas
 - increased risk of dog attacks during koala breeding season (mid-August through to mid-summer)
 - use of on-leash and off-leash areas
 - encouraging dog owners to restrain or confine their dog and notify WIRES if a Koala is found within their property

- Opportunities to participate in Koala habitat restoration/tree planting days in Biodiversity Stewardship Sites and open space areas (Figure 9).

Education and awareness campaigns should recur during the koala breeding season (August to February), when koalas are more likely to be moving about and come into contact with the community.



Figure 9: Potential Community Involvement activities involving Koala habitat restoration (Image courtesy CCC)

7. Responsibility

Responsibility for the implementation of the management actions during design, construction and operational phases that are described in section 5 are shown in Table 4.

Operational actions relating to the Biodiversity Stewardship Sites will be undertaken by Lendlease Communities (Figtree Hill) Pty Limited.

Table 4: Environmental management roles and responsibilities

Role	Responsibilities
Project Manager	<ul style="list-style-type: none"> • Ensure all works comply with relevant regulatory and Project requirements • Ensure the requirements of this KMP are fully implemented • Ensure all personnel and contractors have completed a site induction and orientation • Provide adequate resources (personnel, financial and technological) to ensure effective development, implementation and maintenance of this KMP • Ensure that all personnel receive appropriate induction training • Stop work immediately where there is an actual or potential risk of harm to Koalas.
Construction Manager	<ul style="list-style-type: none"> • Plan construction works in a manner that avoids or minimises impact to Koalas • Ensure the requirements of this KMP are fully implemented • Ensure construction personnel manage construction works in accordance with statutory and approval requirements • Ensure Koala management and protection measures are implemented • Ensure all Project personnel attend an induction prior to commencing works • Liaise with government authorities as required, • Stop work immediately where there is an actual or potential risk of harm to Koalas
Environmental Manager	<ul style="list-style-type: none"> • Conduct site environmental inspections • Investigate and review nonconformances and identify, implement and monitor corrective and preventative actions for nonconformances. • Prepare written Corrective Action Reports within 1 working day of the identification of a need for corrective actions to be taken • Maintenance of training, nonconformance and complaints registers. • Undertake or coordinate environmental monitoring events. • Undertake scheduled and non-scheduled audits.
Project ecologist	<ul style="list-style-type: none"> • Manager Koalas during tree clearing in accordance with the Koala Tree Clearing Protocol (Appendix A) • Possess suitable fauna licences and permits • Provide Koala tree clearing report

8. Implementation

8.1 Monitoring and Inspections

Regular environmental inspections are to be undertaken of all work activities relevant to this KMP being carried out during the construction phase as outlined in the Mt Gilead CEMP. Inspections shall be carried out in conjunction with personnel responsible for a particular work area and shall include the following:

- Daily Inspections – site supervisory staff as part of their daily duties shall conduct daily inspections of the site (incl. all subcontractor activities), and issues noted in daily diaries if applicable, and
- Regular Site Inspections – formal inspections recorded on the Environmental Site Inspection Checklists which shall include cover aspects which present significant risk to Koalas as described in this KMP. Corrective actions arising from inspection are to be managed and implemented within clearly defined timeframes.
- Where a site condition does not comply, a Corrective Action Report (CAR) is to be completed and actioned within one working day of being raised.

8.2 Koala monitoring and Research Program

The NSW CS&E (2020) has recommended that an adaptive management approach, informed by monitoring and data capture will help chart a way forward for managing the local Campbelltown Koala population from the construction phase through to the on-going management phases. A NSW Koala Monitoring Framework is currently being developed which will advocate for a consistent, best practice approach across population dynamics, koala habitat, genetic diversity, disease and reproduction.

The CS&E recommends that parameters that should be monitored include :-

- population dynamics (including age demographics, fertility and sex ratios, mortality and causation, etc.)
- the identification, changes and effectiveness of mitigation actions for key threats (predators, vehicles, etc.),
- tracking how individuals and the koala populations use and disperse throughout the environment (including male movement during mating season, changes in territories, etc.)
- monitoring for the prevalence of disease, such as Chlamydia and KoRV, which should trigger immediate actions such as vaccination if there is a change in levels detected.
- monitoring koala generations over time to understand whether offspring are less stressed than their parents and more accustomed to urban edge locations.

The CS&E also note that there are opportunities to use new technologies such as implantable sensor technologies to understand Koala movements and use of underpasses, drone and sniffer dog technology to detect Koalas to study the population and inform management efforts.

Lendlease has already implemented the use of sniffer dogs and drone technology to get a better understanding of the numbers of Koala using the site and will support a long term, 15 year research program, consistent with statewide monitoring objectives, to address the following issues:-

- Age and size that planted habitat trees in conservation area are used by Koala
- Use of proposed underpasses at Appin Road and corridors within the Mt Gilead study area
- Impact of pathway lighting on Koala movement and use of corridors
- Effect of urban noise on use of corridors by Koala

The results of this monitoring and research will be used to inform an adaptive management program of the conservation areas.

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Appendix A Koala Tree Clearing Protocol

This Protocol provides methodology for Koala tree pre-clearance and relocation for implementation during the removal of trees.

Qualifications of ecologist

A suitably qualified fauna ecologist with experience relating to arboreal fauna will be required to be on-site to supervise the felling of all trees. The ecologist will hold a scientific licence from NSW Department of Planning, Industry and Environment (DPIE) to conduct flora and fauna surveys. This licence requires that all survey and incidental records are submitted to the DPIE for inclusion in their databases (primarily the Atlas of NSW Wildlife).

Fauna ecologist is to take all appropriate hygiene pre-cautions before handling any fauna to prevent spreading diseases.

Pre-clearance survey

A preliminary inspection by the fauna ecologist will be undertaken 7 days prior to tree removal to identify any koala occupation within trees scheduled for removal.

Early in the morning of the day of the proposed clearing, trees to be cleared must be inspected by the fauna ecologist for the presence of Koalas. The following scenarios must be followed:

- Where Koalas are identified within a tree, tree clearing work will not proceed on that day, or until the Koala has voluntarily moved from the tree (typically, a Koala in this situation will vacate the tree on the same or following day)
- Active relocation (capture and relocation) of Koala is discouraged to avoid causing stress to Koala's unless Koala's are found within active works sites where there is a risk of harm or injury
- Where Koalas are not identified within the tree, the tree can be cleared using the below felling technique.

Felling technique

The fauna qualified ecologist must be present on site while the vegetation is removed to provide advice to machine operators and rescue and relocate any fauna encountered and/or injured during tree felling and clearing in accordance with general injured wildlife and tree clearance protocol in the CEMP (ELA 2021).

The fauna ecologist will need to work closely with the operators during the felling operations to make sure works are stopped if Koalas are spotted and require rescue. Prior to felling operations, a site specific Safe Work Method Statement (SWMS) will be prepared outlining the risks and hazards of felling operations.

Koala handling

Any Koalas that are unable to relocate themselves on their own accord will be captured and will be released into suitable habitat off-site (such as the Biodiversity Stewardship Sites) by the fauna ecologist.

If a Koala is injured during the works, the fauna ecologist will ensure that they receive the appropriate levels of care. Depending on the level of injury and status of the injured fauna, WIRES and/or the nearest veterinary clinic are to be contacted to retrieve to take the animal into care or to determine whether the veterinary staff are capable of caring for injured native animals.

Koala pre-clearing records

Records shall be kept by the fauna ecologist detailing the pre-clearing findings, numbers of Koalas observed, including details on any injuries, treatment, and relocation.

Appendix B Example signage showing prohibition of certain activities in reserve

SIMMOS BEACH RESERVE



THE SIMMOS TRACK Circuit 3.9km | 1hr 40min
 Grade 2 - Bushwalking experience recommended, long length formed track with some steps and steep inclines. Explore all corners of Simmos Beach leading to the Georges River and see diverse sandstone vegetation along the riverbank - you will see the reserve in all its glory and might even see a Koala if you're lucky enough!

NORTH RIVER TRAIL Circuit 2.4km | 1hr
 Grade 2 - Suitable for families, medium length formed track with some steps and short inclines. Follow the granite batters downstream along the Georges River taking in the beauty of the large native sandstone cliffs and lush forest vegetation and keep your eyes peeled for Platypus, Crayfish and native waterbirds in the river.

WATERGUM WALK Circuit 0.8km | 30min
 Grade 2 - Suitable for families with young children, short length formed track with some steps and short inclines. Take a short stroll through the natural pathways of the Watergum (Bottlebrush) bushland and up the stairs through sandy changing river to ridge-top native vegetation.

SOUTH RIVER TRAIL Circuit 2.6km | 1hr 10min
 Grade 3 - Bushwalking experience recommended, medium length km so track with some steps and steep inclines. Head upstream through the Grey Myrtles (Blackhouse) myrtle and enjoy the mirrored reflections of the large Grey Gum (Eucalyptus) concrete trees across the Georges River - you might even see a Swamp Wallaby (Macquarie bandicoot).

QUARRY WALK Circuit 1.2km | 30min
 Grade 2 - Suitable for families with young children, short length concrete path with minor elevation. Follow the easy grade concrete path as it winds its way through the attached sandstone vegetation to the site of the old Simmos Beach quarry which was resumed for recreational purposes in 1970.

Simmos Beach Reserve is one of Campbelltown's highest valued assets, striking the perfect balance between conservation and recreation.

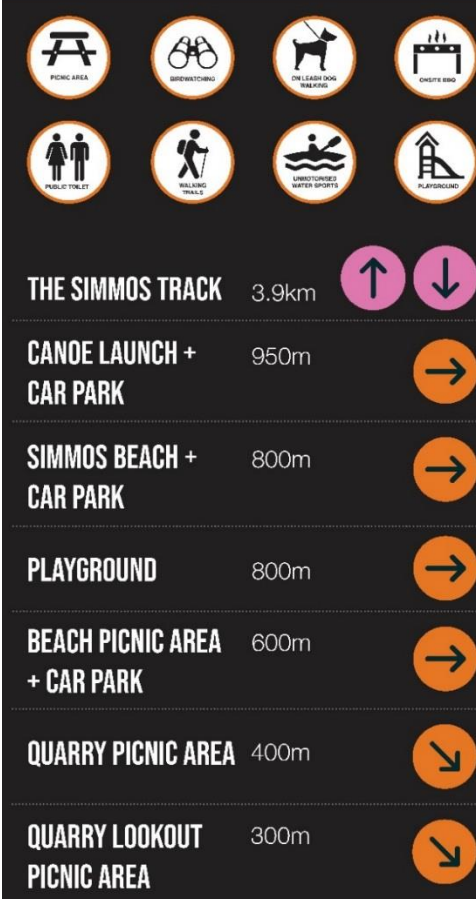
As part of the traditional Unwaraa (Indigenous) lands and the bushland of the people upon Georges River, the reserve is rich in biodiversity and home to threatened ecological communities as well as many threatened plants and animals, all of which are protected under both state and federal legislation.

The reserve was officially opened in 1980 by Campbelltown City Council, with a strong aim to conserve and improve its natural beauty, while providing a key recreational asset to the Campbelltown community. Since its opening, ongoing improvements have been made including the installation of concrete playground facilities, a sandy beach, the creation of the quarry cur and a network of pool-like walking trails.

The name Simmos Beach originates from a local barkidjari word for water, the word 'Simmo' (Simmo) who occupied the reserve during the mid-1900s prior to being proclaimed as a conservation and recreation reserve.

www.campbelltown.nsw.gov.au
 To report illegal activity, please call Campbelltown City Council on 4645 4000.

SIMMOS BEACH RESERVE



THE SIMMOS TRACK 3.9km ↑ ↓

CANOE LAUNCH + CAR PARK 950m →

SIMMOS BEACH + CAR PARK 800m →

PLAYGROUND 800m →

BEACH PICNIC AREA + CAR PARK 600m →

QUARRY PICNIC AREA 400m ↘

QUARRY LOOKOUT PICNIC AREA 300m ↘

Simmos Beach Reserve is open from 7am to dusk 7 days a week. For the comfort and safety of all visitors to the reserve, please observe all the signage and take reasonable care. The following activities are prohibited in this public place unless approved by Campbelltown City Council. Fines may exceed \$110 in accordance with the Local Government Act 1993.

Prohibited Water swimming not recommended

Edge/Drop off

Uneven Ground

No Fires

No Motorbikes

No Alcohol

No Horse Riding

No Camping

www.campbelltown.nsw.gov.au
 To report illegal activity, please call Campbelltown City Council on 4645 4000.

(Image courtesy CCC)

